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ANNOTATED LIST OF THE INJURIOUS AND BENEFICIAL INSECTS OF THE AVOCADO IN FLORIDA*

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INJURIOUS INSECTS

Trialeurodes floridensis Q.—The Avocado White Fly. Like citrus, the avocado also possesses its particular white fly. This species attacks the avocado in the more protected growing sections as does the Dictyospermum Scale. It is smaller than any of the citrus white flies, possesses white wings and a pale yellowish body. The pupae are readily distinguished by having a characteristic fringe. It multiplies rapidly during the summer months, and causes sooty mold in considerable abundance where present. The avocadoes growing along the keys and ocean shore are more particularly attacked by this white fly than are those growing on the mainland. Trees in the nursery which are more or less protected often become badly infested with this species. The species is present in Florida wherever avocadoes are grown.

Tetranychus yothersi McG.—The Avocado Red Spider Mite. The red spider mite which attacks the camphor in the northern part of Florida, seriously attacks the avocado at certain times of the year. This is particularly true during the dry winter months. This mite, when abundant, gives a grove a very unsightly appearance, by yellowing and browning the foliage. It is the only red spider mite known to the writer which lives and performs its depredations on the upper surface of the foliage.

Heliothrips hemorrhoidalis Bouche.—The Greenhouse Thrips. This species, which is so common in greenhouses in the northern states, attacks the avocado in Florida in the open, and is present in varying numbers throughout the year. It becomes seriously abundant in places on the approach of dry weather in the fall and winter, and is capable of doing considerable damage by causing defoliation. It works on the upper surface of the foliage as does the avocado red spider mite. It also attacks the fruit when it becomes numerous. Like the white fly of the avocado it multiplies more rapidly in the orchards situated on the keys and beach places in southern Florida.

Chrysomphalus dictyospermi, Morgan.—The Dictyospermum Scale is a small circular scale of a light brown color. It is particularly abundant on the avocado in the more protected places, and where the temperatures are more even. Especially is this true along the ocean shore and keys. It attacks the branches killing many of the smaller limbs, but when abundant may often kill the tree.

Saissetia oleae, Bernard.—The Black Scale becomes particularly noticeable in avocado groves on the keys and ocean front, especially during the fruit forming period, by congregating in masses about the stems of the fruits. Here it produces honey dew which accumulates on the fruit in which the black sooty mold develops necessitating washing of the fruit. Fruits so attacked by this scale bear weak stems and invariably drop prematurely. It does not apparently become abundant on the mainland.

Pseudococcus nipae, Mask.—The Cocoanut Mealy Bug becomes noticeable at times on the avocado in certain sections where it has become established. It attacks the foliage particularly.

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Pulvinaria pyriformis, Ckll.—The Pyriform Scale. This species, where present, does considerable damage to the avocado. It is brownish in color, rounded or ovate in shape, and on maturing, when the egg sacs are produced, a cottony material pushes out from under the edges of the scale. It produces an abundance of honey dew for sooty mold to develop. The scale is prevalent wherever the avocado is grown, especially on seedling trees growing in neglected yards.

Frankliniella cephalica var. *masonii*, Watson.—This species of thrips which is light yellow in color attacks the avocado in the bloom. The writer has observed that the West Indian varieties growing in groves along the keys and on the mainland.become infested with it. The thrips deposits its eggs in the pedicel of the flower clusters. These punctures at times are very numerous, depending on the variety of avocado, causing the flower cluster to drop. The species differs from the citrus thrips in being considerably lighter in color.

Empoasca minuenda, Ball.—The Avocado Leaf Hopper. This leaf hopper which is exceedingly small and yellowish in color attacks the avocado foliage by sucking the plant juices. It confines its attacks to the lower surface of the leaf and causes white spots to appear on the foliage viewed from above. When very numerous, this species will give an avocado tree a decidedly whitish appearance. It is particularly abundant on the avocado during the growing season.

Gracilaria sp. near *niolacella* Clem.—The Avocado Leaf Roller. This small greyish moth is present wherever avocadoes are grown. It deposits its eggs on the new growth. The larvae which hatch from these eggs curl the foliage on which they feed. The foliage on maturing develops unevenly giving the tree a decidedly ragged appearance, especially is this true when this species is abundant. The larvae are small and yellowish in color.

Dysdercus suturellus H. Schf.—The Cotton Stainer. This is one of the plant bugs and often attacks the fruit of the avocado in considerable numbers. The species congregates on the fruit where it injures it by puncturing and sucking the plant juices. The punctures afford entrance places for plant diseases to enter and develop. It is only in certain years that this insect appears in the groves.

Acysta perseae Heid.—The Avocado Tingid. This species, which feeds upon the juices of the foliage of the avocado, is a small lace bug. The insect causes the leaves to appear yellowish and drop. The species is not widely distributed, however.

Anomala undulata, Mels.—This small beetle, or leaf chafer, visits the avocado groves in swarms during the blooming period in southern Florida during certain years. It is nocturnal in its habits, coming out from the soil at night and devouring the bloom wherever present. Its depredations last only a week or so, the adults returning to their breeding grounds. It is not known where they breed. This species is capable of doing considerable damage.

Caulophilus latinasus.—This small brownish weevil, which resembles the grain and rice weevils, attacks the seed of the avocado in the orchard in fallen fruits and wherever seed is stored for planting purposes. The larvae and weevils completely tunnel the seed rendering them worthless.

Sparganothis (Platynata) sp.—A moth, which is of a light brown color, deposits its eggs in the avocado blossom cluster. The larvae which hatch from these eggs in turn tie the blossom cluster together with their webs to form a nest; the larvae feed on the flower parts. This insect has not been noticed in large numbers nor is it widely distributed. Wherever they should become abundant, they would be capable of considerable injury. The larvae when full grown are about a half inch in length and a dark green in color.

Lypsimena fuscata, Lec. and *Elaphidion inerme,* Newm.—These two Cerambycid beetles attack the dying or unhealthy branches of the avocado. This is true especially after a freeze. If the dying branches are allowed to remain the borers or larvae often burrow down into the healthy tissue beyond the axis of the branches.

A number of scale insects of minor importance have at times been noticed on the avocado doing damage to individual trees. Some of these are the Common Mealy Bug, *Pseudococcus citri* Risso; Florida Wax Scale, *Ceroplastes floridensis* Comst.; Hemispherical Scale, *Saissetia hemisphaerica* Targ.; and the European Fiorinia, *Fiorinia fioriniae* Targ.

BENEFICIAL INSECTS

A number of beneficial insects, either predatory or parasitic on the previously named injurious insects of the avocado in Florida, are as follows:

Sympiesis dolichagaster, Ashm.—Represents a parasite which keeps the avocado leaf roller in check to a considerable extent. It is a small greenish colored hymenopterous insect.

Chrysopa lateralis, Guer.—This lace wing fly is present on the avocado in considerable numbers at the time the avocado red spider mite is present in abundance. The larvae of this species carry with them a protective covering of small particles which is characteristic of some lace wing flies. The larvae devour large numbers of the red spider mites.

Franklinothrips vespiformis, Crawford.—This is a large species of thrips. It is black with a whitish band and is very active on the foliage when disturbed. It is present in large numbers on the avocado in the late winter or early summer. The larvae and adults of this thrips destroy large numbers of all stages of the avocado red spider mite. The adults resemble ants on the foliage. It is also predatory on the larvae of *Heliothrips hemorrhodalis* Bouche' and the nymphal stages of *Empoasca minuenda* Ball. It attacks the avocado white fly, *Trialeurodes floridensis* Q., in the larval and pupal stages as well as the egg stage. This thrips is peculiar in its habits in that it spins a cocoon, on the lower surface of the leaf, in which the larva pupates. The larvae are a deep red in color also possessing a whitish band on the body.

Scymnus utilis, Horn.—This insect is commonly found among the red spider mite colonies on the avocado. It is a small lady bird beetle about the size of a pin head, black in color. With the beetles may be found their dark brown larvae, also feeding on all stages of the red spider mite. This species is very beneficial.

Scymnus kinzeli, Casey.—Another lady bird beetle. It is larger than the former and is bicolored, abdomen black and head reddish. It is never abundant, however.

Leptothrips mali, Hinds.—This is a large black thrips and is very active on the foliage. When disturbed it elevates its body as if going to sting.

It is not abundant, and is found predatory in both the larval and adult stage on the avocado red spider mite.

Prospaltella sp.—This species is a small hymenopterous parasite, frequently bred from the pupal and larval stages of the avocado white fly, *Trialeurodes floridensis* Q.

Cryptognatha (Delphastus) pallida, Lec.—This a small lady bird beetle, light brown in color and about the size of a pin head. It is one of the Scymnus group. The larvae are whitish in color. Both the larvae and adults are very beneficial, being predatory upon the avocado white fly in the larval and pupal stages.

Scolothrips sexmaculatus, Pergande.—This thrips, which is light in color, possesses six spots on the abdomen. It was not found by the writer to be abundant and feeds when present in both the larval and adult stages on all stages of the avocado red spider mite, *Tetranychus yothersi*, McG.

Aspidiotiphagus citrinus, Craw.—A hymenopterous parasite found to be destroying considerable numbers of the dictyospermum scale, *Chrysomphalus dictyospermi*, M.

MOSQUITOES FOUND ABOUT GAINESVILLE, FLA.

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Baume, oil in some pool and creek beds that could not be readily drained, with good success. He found this to be efficient for from one to four weeks, depending upon the nature of the pond and the exposure to the wind. To be on the safe side, the pond should usually be oiled every two weeks. He used a barrel spray pump in the accessible places and a knapsack pump in the others to good advantage, but it may be simply poured on from a sprinkler or applied from a bucket with a mop. In inaccessible swamps, it is sometimes applied by standing a barrel on end and boring a small hole near the bottom so there will be a constant drip.

In the Panama Canal work there was considerable difficulty in getting the oil to completely cover the surface when the vegetation was thick. There they found a solution made from one hundred and fifty pounds of sulphuric acid, one hundred and fifty pounds of powdered resin, and thirty pounds of caustic potash boiled together made a good larvaecide (Gorgas 1909), which, in some cases, was more effective than fuel oil.

A pool on the campus between Buckman and Science Halls, and the septic tank back of Thomas Hall, have been treated with "Zenoleum" disinfectant twice. This forms a milky mixture with the water and kills the larvae in a short time. Both pupae and larvae were found alive four hours after application, but all were dead next morning. No record was obtained of how much was applied, but enough to make the water appear decidedly milky. It was found to prevent egg laying for about twelve days, and should be applied about every two weeks.